

STEEL

Project Fact Sheet

CLEAN COKE PRODUCTION



BENEFITS

- Saves about 14 thousand Btu/pound of coke recovered rather than discarded
- Potentially recovers the energy content of about 10 million tons/year of coke and coal fines that are currently discarded as waste
- Converts waste streams from coal and coke production into useful sources of raw material
- Eliminates the need for coking coals
- Eliminates the disposal of potentially harmful byproducts by using them to fuel the process and to bind the fine solids
- Reduces the cost of finished briquettes to about half the price of traditional coke.

APPLICATIONS

The technology's primary application is to produce fuel for the steel industry's iron blast furnaces.

The finished product can also be used in cupolas in the foundry industry.

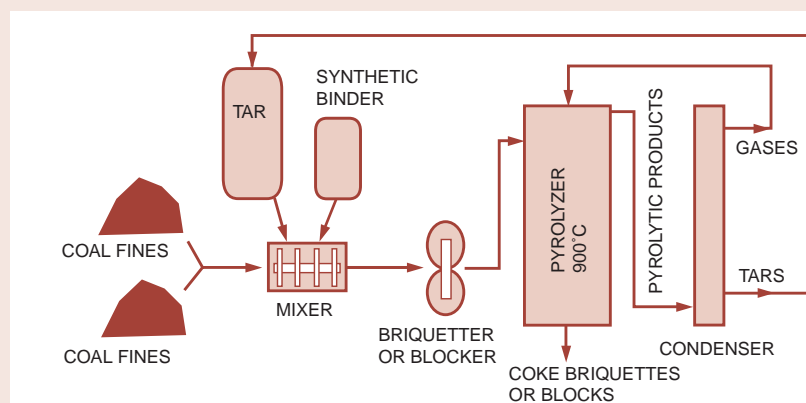
For both applications, the technology's uniqueness promises a less expensive, high-performance product that should compete well against conventional metallurgical grade coke.

THE CLEAN PRODUCTION OF COKE FROM WASTE CARBONACEOUS FINES OFFERS AN ENVIRONMENTALLY CONSCIOUS AND COST-EFFECTIVE ALTERNATIVE TO CONVENTIONAL COKE PRODUCTION

In the United States, the demand for coke used for fuel exceeds domestic supply. A new process that produces coke from waste carbonaceous fines will increase the U.S. supply of coke and provide a less expensive fuel for the steel industry. The process is projected to provide the means to produce about 10 million tons of coke per year.

About 20.3 million tons of furnace coke can be produced in the United States annually. That is 5.6 million tons less than the annual U.S. demand. The production capacity of foundry and industrial coke is 1.8 million tons. Because these quantities are insufficient to meet demand, the United States is a net importer of coke. The fact that Bethlehem Steel and LTV Steel plan to close coke-making facilities will further increase demand.

CLEAN PRODUCTION OF COKE FROM WASTE CARBONACEOUS FINES



The process for the clean production of coke from waste carbonaceous fines could recover the energy content of about 10 million tons/year of coke and coal fines that are currently discarded as waste.



Project Description

The invention is a process for manufacturing metallurgical grade coke briquettes and blocks from salvaged coke dust by mixing it with a precise amount of waste coal dust and a proprietary binder. The mix is heated to 9000 C in a pyrolyzer. In each batch, the gaseous output fuels the process, while the liquid output is used completely to bind the briquettes. Coke dust and coal dust are blended such that there are no excess liquids or gases, resulting in zero discharge to the environment.

The clean production of coke from waste carbonaceous fines consumes waste products, as it relies on the coke-fines discards from coke manufacture as a raw material. The process is similar to that used in conventional coking ovens, except that the production of tars and volatiles is restricted to that required for binding. A key advantage of the process is that it does not produce a by-product, as the process consumes the hydrocarbons.

Progress and Milestones

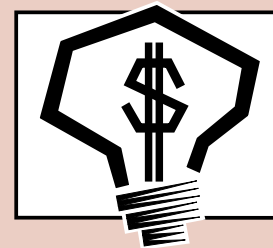
- The inventor, Craig Eatough, is seeking proprietary protection of the process for the clean production of coke from waste carbonaceous fines through the U.S. Patent Office.
- Following a positive evaluation of the technology in November 1997, the National Institute of Standards and Technology placed the clean production of coke from waste carbonaceous fines process in the "technical feasibility" stage as defined by Engineering Stages of New Product Development.
- Current efforts are focused on further research and development of the technology for testing purposes. Craig Eatough is developing this new technology with the help of a grant funded by the Inventions and Innovation Program through the Department of Energy's Office of Industrial Technologies.

Economics and Commercial Potential

The clean production of coke from waste carbonaceous fines offers the potential for significant energy savings for both steel makers and foundries. If implemented fully, the process could recover the energy content of about 10 million tons/year of coke and coal fines that are currently discarded as waste. Direct energy savings is estimated at about 14 thousand Btu/pound recovered instead of discarded.

In addition, the proposed process could make the same quality of metallurgical grade coke produced at a conventional plant for about one-sixth the investment cost. That represents a payback of about one to two years.

One of the most beneficial features of this process is that there are no byproducts, hence no environmental problems. As coke-making facilities are increasingly struggling to meet the stringent Clean Air Act standards, the invention's environmental features should become more attractive to the industry.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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INDUSTRY OF THE FUTURE—STEEL

*Through OIT's Industries of the Future initiative, the Steel Association, on behalf of the steel industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, **The Re-emergent Steel Industry: Industry/Government Partnerships for the Future.***

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